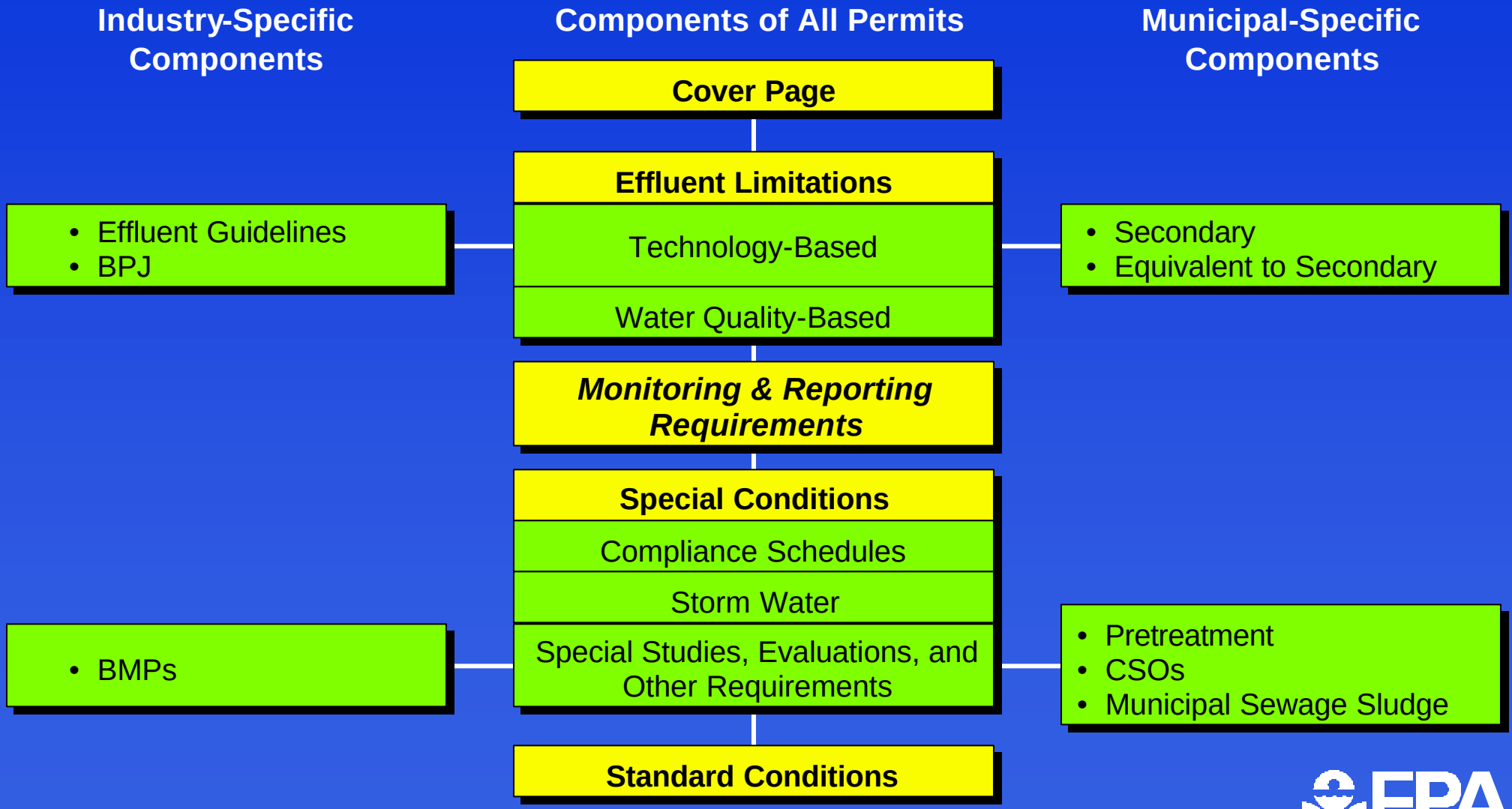
Monitoring and Reporting Conditions

Permit Components



Learning Objectives

- Describe purpose of monitoring conditions
- Discuss the considerations for establishing monitoring conditions
- Explain analytical method requirements
- Describe reporting requirements

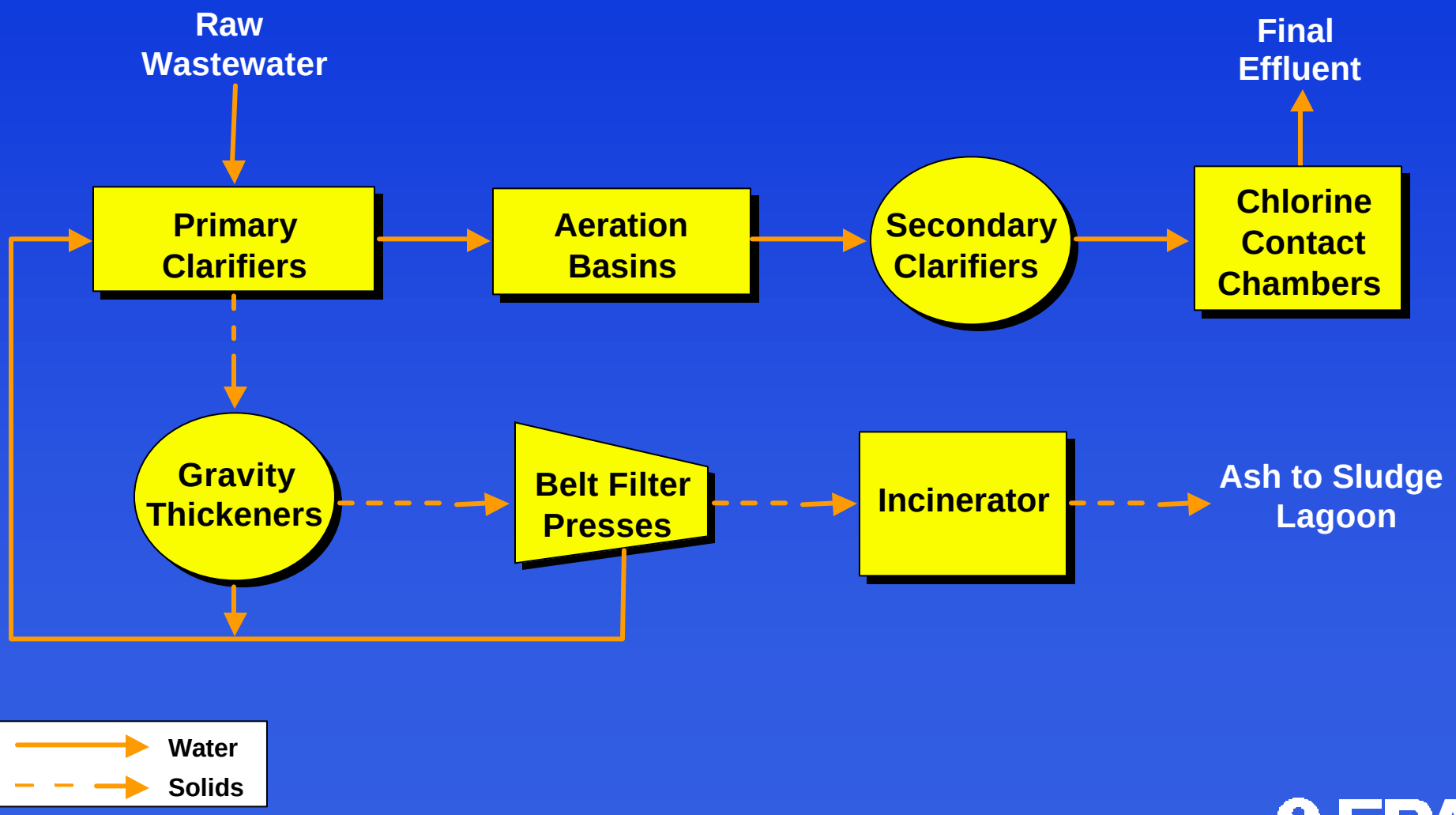
Purpose of Monitoring

- Determine compliance with permit conditions
- Establish a basis for enforcement actions
- Other
  - Assess treatment efficiency
  - Characterize effluents
  - Characterize receiving water

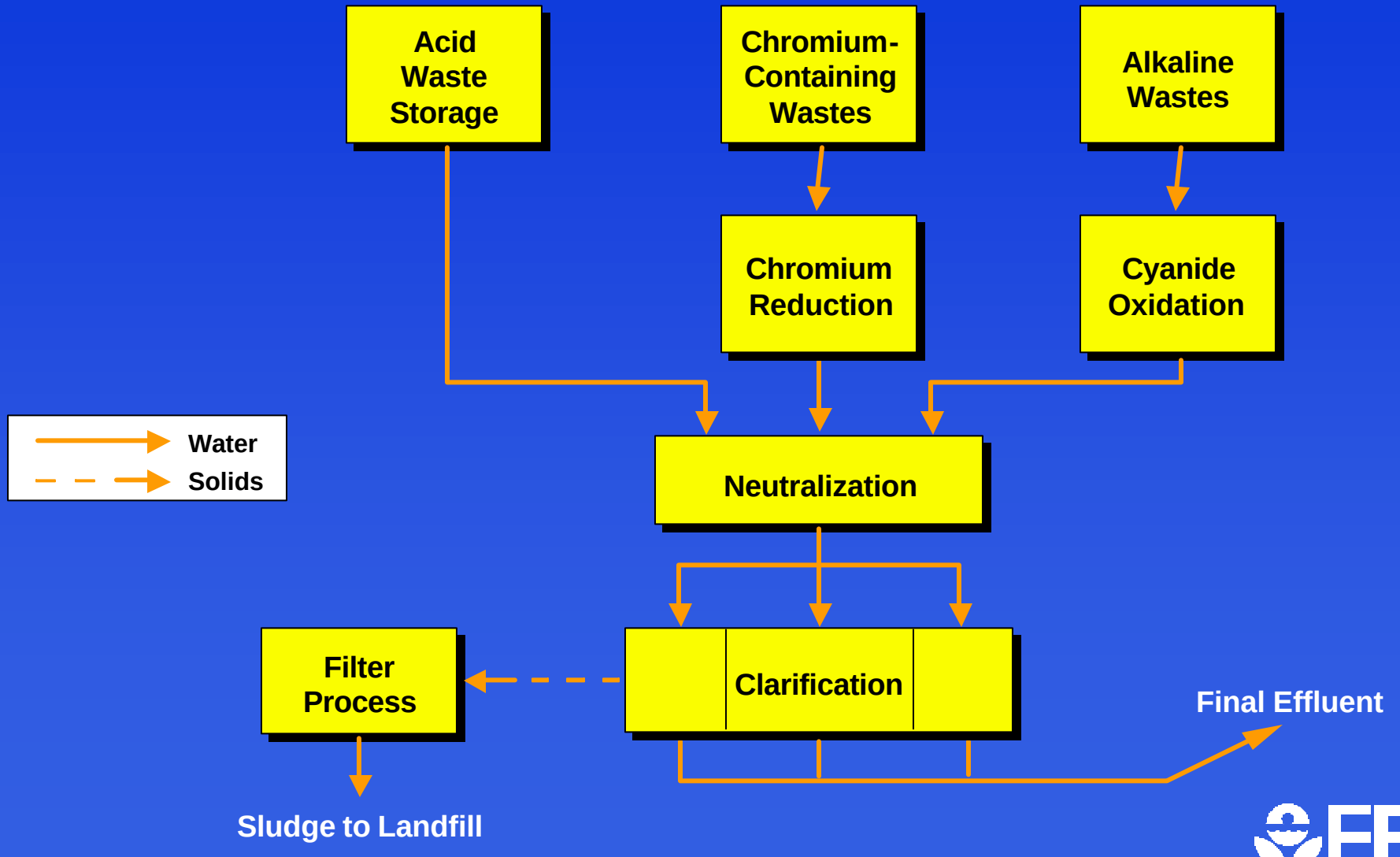
Types of Monitoring

- **Self monitoring**
  - Permittee performs sampling and analysis
- **Compliance monitoring**
  - Permitting authority monitors effluent during compliance inspection

Example POTW: Flow Diagram



Example: Industrial Flow Diagram



Self Monitoring Considerations

- Location
- Frequency
- Type of sample
- Cost

Considerations for Monitoring Location

- Is it on the facility's property?
- Is it accessible?
- Will the results be representative of the targeted wastestream?
- Are internal monitoring points needed?

Frequency Considerations

- **Federal Requirements**
  - Annual for all regulated pollutants
    - Waivers available for ELG based limits
    - 40 CFR 122.44 (a)(2)
- **State Requirements**
  - Consult State policy and procedures

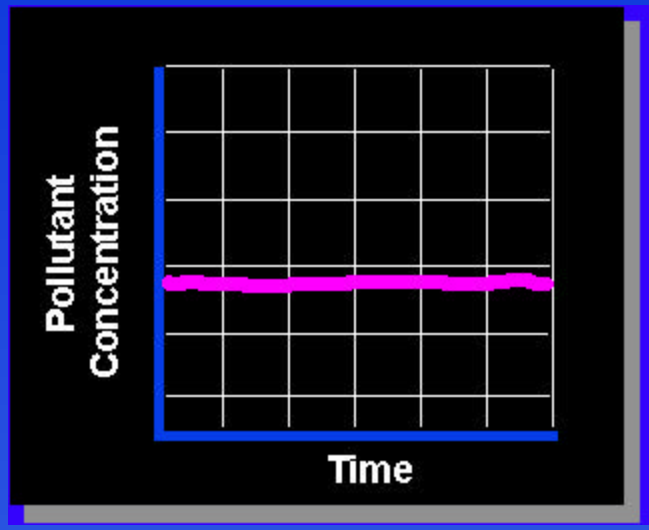
Frequency Considerations (cont)

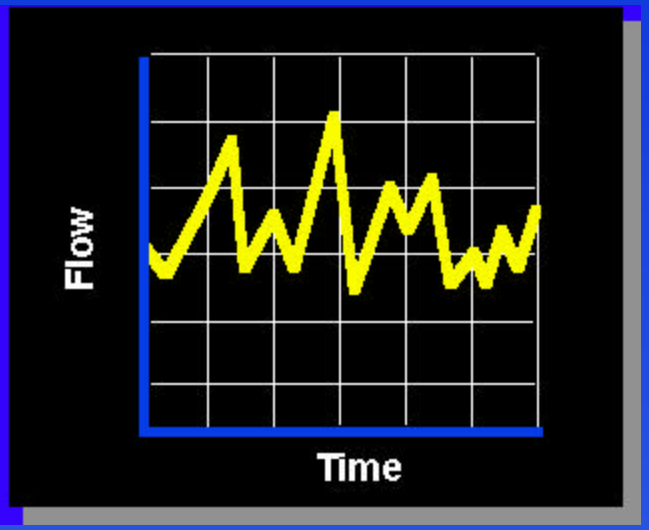
- Size and design of facility
- Type of treatment
- Location of discharge
- Frequency of discharge (batch, continuous)
- Compliance history
- Nature of pollutants
- Number of monthly samples used in developing permit limit

Types of Samples

- **Grab Sample: Taken from a wastestream on a one-time basis without consideration of the flow rate of the wastestream and without consideration of time**
  - **Must be used to monitor certain parameters (e.g., pH, volatile organics, cyanide)**
  - **Used for monitoring batch discharges**

Example Situation – Case #1





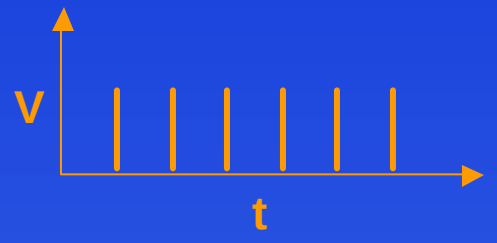
- Slight daily fluctuation in pollutant concentration and flow
- Recommendation: Grab Sample

Types of Samples (Continued)

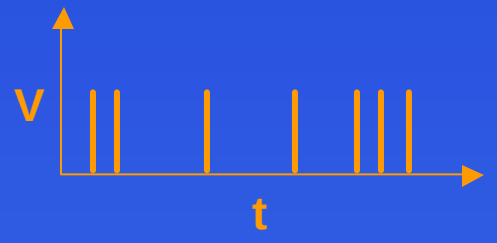
- **Composite**: Sample composed of two or more discrete aliquots. The aggregate sample will reflect the average water quality over the sample period.
  - More representative measure of the discharge of pollutants over a given period of time
  - Accounts for variability in pollutant concentration and discharge flow rate
  - May be sequential discrete samples or a single combined sample

Types of Samples (Continued)

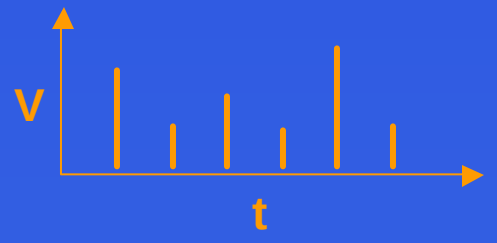
- **Composite Sample is defined by the time interval between aliquots, and the volume of each aliquot (t, V).**
  - **Time Proportional (t_c, V_c): Interval time and sample volume are constant**



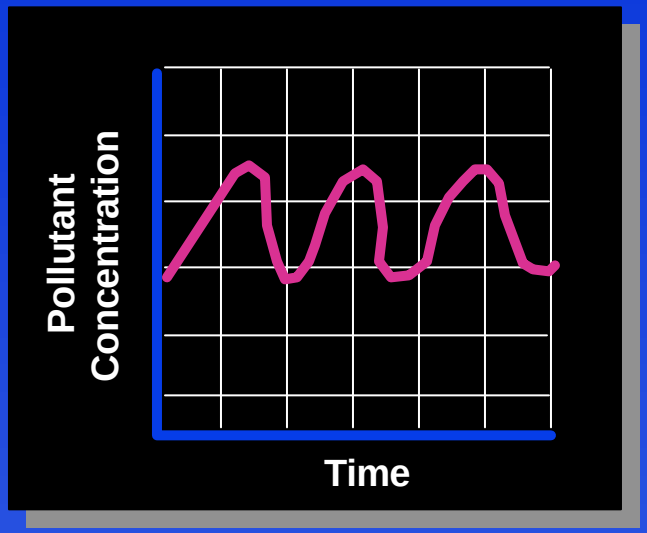
  - **Flow Proportional: Interval time or sample volume may vary**
    - **Constant volume (t_v, V_c)**

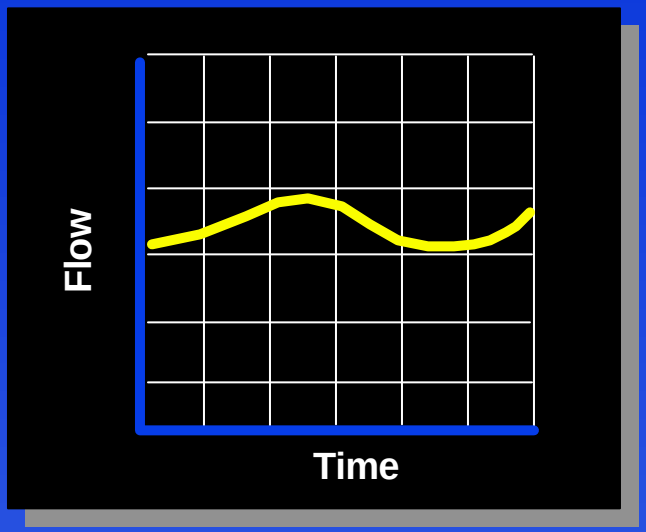


    - **Constant time (t_c, V_v)**



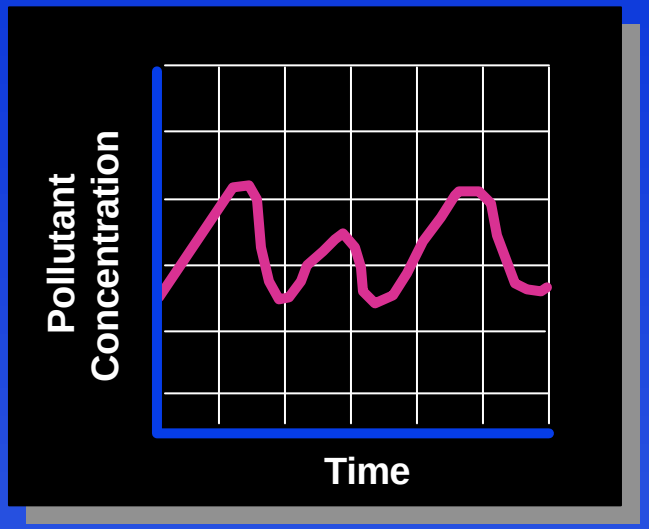
Example Situation – Case #2

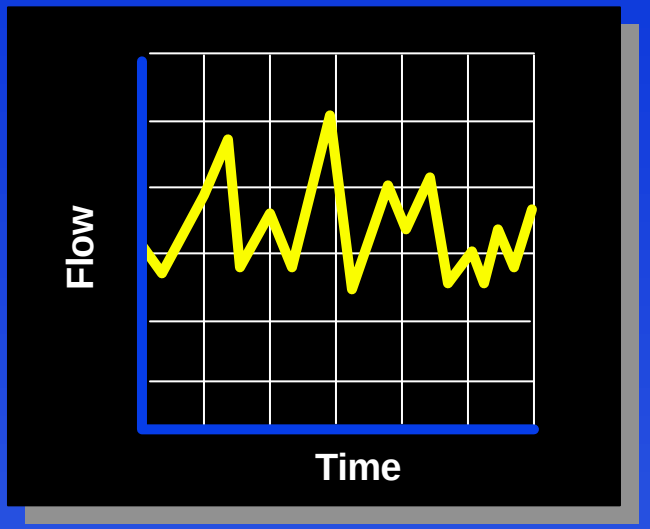




- Regular fluctuations in pollutant loading over the course of the day
- Very slight fluctuations in flow
- Recommendation: Time Proportional Composite

Example Situation – Case #3





- Irregular fluctuations in pollutant loading over the course of the day
- Erratic fluctuations in flow
- Recommendation: Flow Proportional Composite

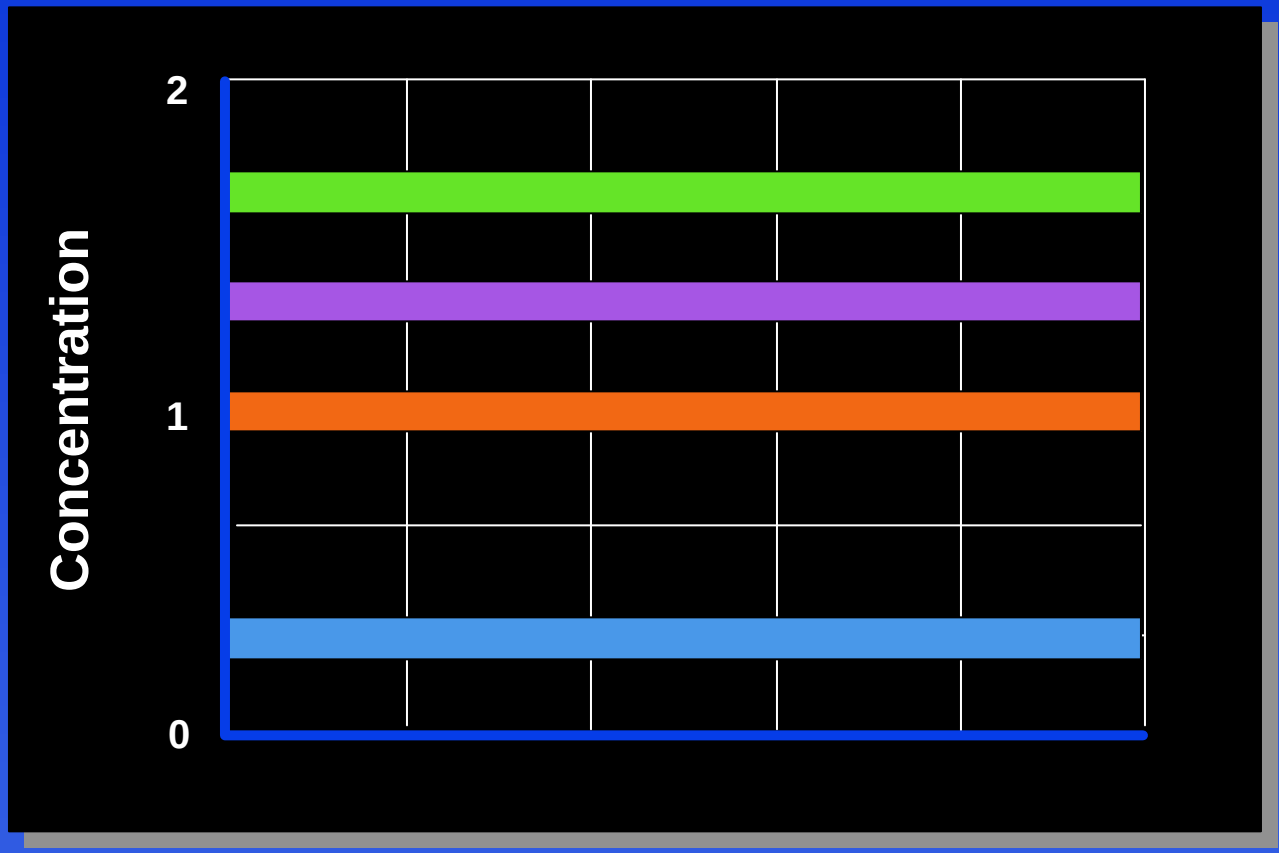
Types of Samples (Continued)

- **Continuous Sample**: Automated collection and analysis of a parameter in a discharge
  - Typically used for pH and flow
  - 40 CFR § 401.17 allows excursions for pH

Analytical Methods

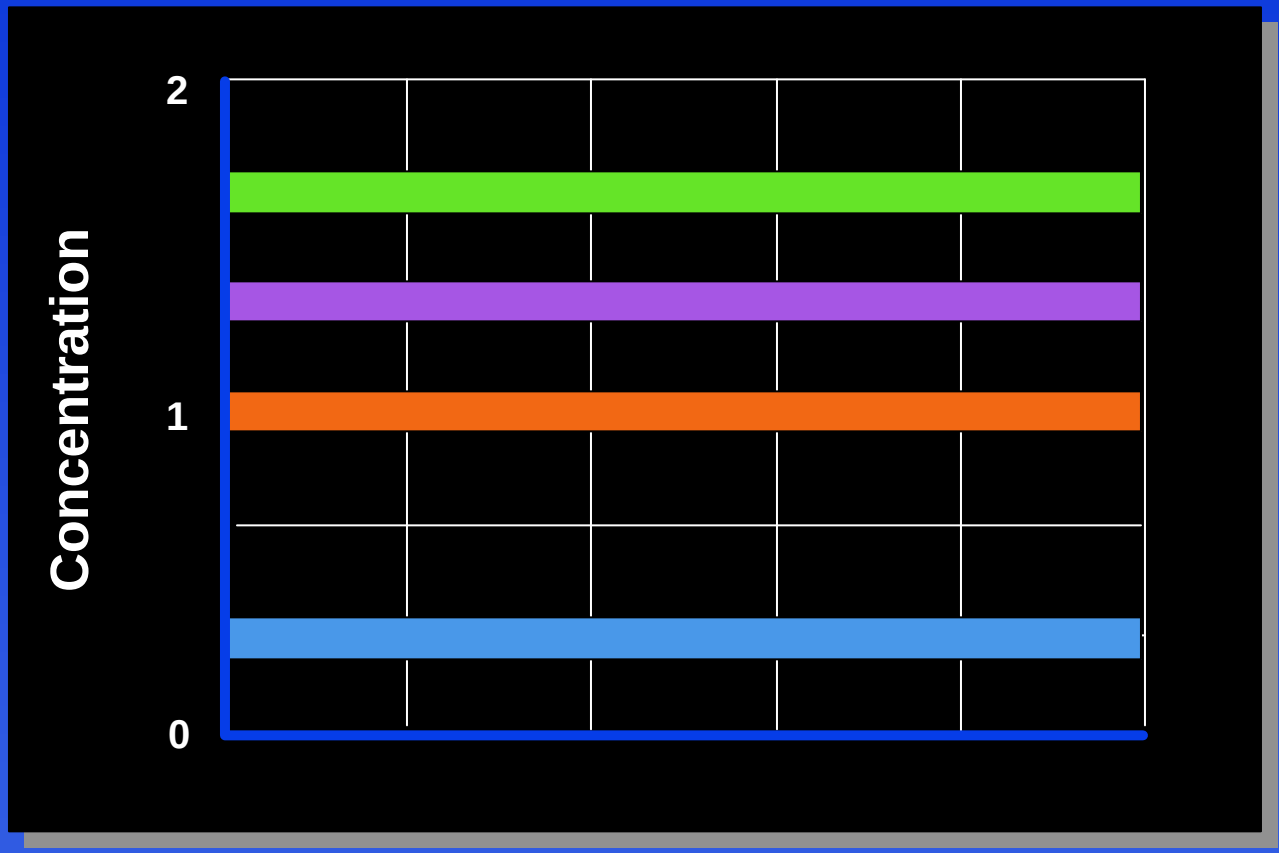
- 40 CFR Part 136
  - Test methods in Appendix A to Part 136
  - Standard Methods for the Analysis of Water and Wastewater
  - Methods for the Chemical Analysis of Water and Wastes
  - Test Methods: Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater
- Alternative methods

Analytical Detection Level Considerations



- Compliance with Limit #1 ➞ 40 CFR Part 136
- Compliance with Limit #2 ➞ ? ? ?

Analytical Detection Level Considerations



- Compliance with Limit #1 ➞ 40 CFR Part 136
- Compliance with Limit #2 ➞ ? ? ?

EPA

Estimated Costs for Analytical Procedures

BOD5	$30
TSS	$15
TOC	$60
Oil and Grease	$35
Odor	$30
Color	$30
Turbidity	$30
Fecal coliform	$15
Metals (each)	$15
Cyanide	$35
Gasoline (Benzene, Toluene, Xylene)	$100
Purgeable Halocarbons (EPA Method 601)	$113
Acrolein and Acrylonitrile (EPA Method 603)	$133
Purgeables (EPA Method 624)	$251
Phenols (EPA Method 604)	$160
Organochlorine Pesticides and PCBs (EPA Method 608)	$157
Polynuclear Aromatic Hydrocarbons (EPA Method 610)	$175
Dioxin (2, 3, 7, 8-TCDD) (EPA Method 613)	$400
Base/Neutrals and Acids (EPA Method 625)	$434
Priority pollutant scan*	$2,000
TCLP	$150
Acute WET	$750
Chronic WET	$1,500

* Includes 13 metals, cyanide, dioxin, volatiles (purgeables), base/neutral and acids, pesticides and PCBs, and asbestos

EPA

Example #1: Annual Analytical Costs

	Times Per Year	Unit Cost ($)	Annual Cost ($)
BOD5	104	30	3,120
TSS	104	15	1,560
Fecal Coliform	104	15	1,560
Oil and Grease	104	35	3,640
		Total	9,880

Example #2: Annual Analytical Costs

Pollutant	No. Samples	Cost/ Sample	Cost/ Year
Priority Pollutants	4	$2,000	$8,000
Acute WET	4	$750	$3,000
Phenols	12	$160	$1,920
Cyanide	52	$35	$1,820
BOD5	156	$30	$4,680
TSS	156	$15	$2,340
Metals (Ni, Cr, Cu, Pb, Zn)	780	$15	$11,700
		Total	$33,460

EPA

Reporting of Monitoring Results

- What is reported?
  - Data required in permit
  - Data for pollutants monitored more frequently than required
- When is information reported?
  - At least 1/year for limited pollutants
- Who is responsible for reporting?
  - The Permittee
- What format is used for reporting?
  - Discharge Monitoring Reports

Discharge Monitoring Reports (DMRs)

- **Must be used to report self-monitoring data**
  - **Required at 40 CFR §122.41(1)(4)(i)**
  - **States may alter format**

Record Keeping

- Records of monitoring must be kept for 3 years
  - Records for sewage sludge use and disposal activities must be kept for 5 years
- Monitoring records include:
  - Date, place, and time
  - Individual performing sampling
  - Date of analysis
  - Individual performing analysis
  - Analytical methods used
  - Analytical results
- Permit should specify where records should be located